RELATIONSHIPS BETWEEN READING AND WRITING PERFORMANCE: A CORRELATIONAL STUDY OF METROPOLITAN READING SUBSCORES AND NATIONAL ASSESSMENT WRITING SCORES

By

SUSAN SAMUELS HILL

A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL OF
THE UNIVERSITY OF FLORIDA
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1982

ACKNOWLEDGMENTS

I would like to express my appreciation to Dr. Ruthellen Crews for her guidance and cooperation as chairperson of my committee. I also wish to thank the other numbers of my committee, Dr. William Hedges and Dr. Stephen Olejnik, for their direction and editorial comments.

My sincere appreciation and gratitude are expressed to my husband, Greg West, for his expertise and loving encouragement, and to my sons, Chad and Michael, for their special dedication and love.

Finally, this dissertation and my graduate studies would not have been possible without the love and support of my parents, Edward and June Samuels, and my brothers and sister, Gary, Brad, Brent, Brian, and Shelley.

TABLE OF CONTENTS

Abstract of Dissertation Presented to the Graduate Council of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

RELATIONSHIPS BETWEEN READING AND WRITING PERFORMANCE: A CORRELATIONAL STUDY OF METROPOLITAN READING SUBSCORES AND NATIONAL ASSESSMENT WRITING SCORES

By

Susan Samuels Hill

May 1982

Chairperson: Ruthellen Crews
Major Department: Curriculum and Instruction

The purpose of this study was to determine whether specific skills of reading were significantly related to specific skills in writing in order to provide implications for reading instruction.

In this study, 36 seventh-grade students and 63 eighth-grade students were administered the Metropolitan Achievement Test (MAT). Each of the 99 students also wrote a composition on a descriptive topic from the 1978-79 National Assessment of Educational Progress (NAEP) released exercises. The data used in the analysis included a total reading score and the six reading subscores from the MAT. The subscores included Vocabulary, Literal Specific, Literal Global, Inferential Specific, Inferential Global, and Evaluation. In addition, the writing sample collected from each student was analyzed to produce 13 NAEP writing scores, one for each of the following qualities: holistic,

paragraph coherence, agreement errors, punctuation errors, spelling errors, capitalization errors, nominal clauses, nominal phrases, relative clauses, modifying phrases, adverbial clauses, adverbial phrases, and inter-T-unit coordination. The NAEP scoring guidelines were used to determine these scores.

The data were submitted to a factor analysis and a multiple regression analysis. The 13 NAEP writing variables were factor analyzed to reduce the set of scores to a smaller set of constructs. Five factors were determined to be meaningful. These five factors were then regressed on the MAT reading scores. The regression analysis indicated that three of these five factors were significant predictors of the total MAT reading score: the Writing Mechanics Factor, which included agreement, punctuation, spelling, and capitalization; the Writing Quality Factor, which included the holistic score and paragraph coherence; and the Nominal/Modifying Phrase Factor. The R^2 statistic for the overall regression model was 0.31. The statistical analysis, therefore, indicated that there was a significant relationship between reading and specific factors in writing performance. Since reading and writing performance were found to be correlated, it was recommended that reading and writing instruction should be integrated. It was also recommended that further research should be done to determine the direction of causality.

CHAPTER I
INTRODUCTION

Statement of the Problem

The primary purpose of this study was to investigate the relationships between students' performances in reading and written composition, as measured by reading scores from the Metropolitan Achievement Test (MAT) and the scoring of a writing sample using the National Assessment of Educational Progress (NAEP) guidelines. The results of this study will be used to determine whether specific skills of reading are significantly related to specific skills of writing, and, therefore, provide implications for reading and writing instruction.

Need for the Study

Relationships among and between reading, writing, speaking, and listening are topics frequently cited in professional literature (Betts, 1957; Loban, 1976; Moffett, 1968). In the National Council of Teachers of English research bulletin Interrelationships among the Language Arts, Artley (1954) states

> Research and the evolution of professional thought in psychology and philosophy in semantics, and in child growth and development have lent support to the contention that there is an inherent unity among the communications area. . . . They are closely related by content and by use, purpose, and development. Each reinforces the other. The concept of the relatedness of the language arts is by no means a mere academic one. It has far reaching and very concrete implications for curriculum designers and teachers of reading, spelling, and language. (p. 3)

Artley's suggestions that the language arts are related have been substantiated by findings from later research which have shown that relationships exist among reading, writing, speaking, and listening (Loban, 1976; Moffett, 1968). As a result of the findings, a greater integration of language arts instruction has been encouraged (Bond & Wagner, 1966; Durkin, 1966). The need for further research to explore the specific interrelationships has been noted by Townsend (1954) and Applebee (1977).

Up to the present, the correlation research and descriptive research have looked at the significance of several combinations of language arts variables, such as the relationships between oral language and writing (Becker, 1963; Radcliffe, 1972), between oral language and reading (Betts, 1943; Ruddell, 1965), and between reading and listening ability (Meckel, 1963). Few researchers, however, have investigated the relationships between reading and writing. The research reported on the relationship of reading and writing has usually related objective test scores of reading and spelling or grammar test scores (Hildreth, 1954) rather than to analyses of writing samples. In addition, the studies which have related reading and writing performance have offered few specific suggestions as to implications for the classroom and for reading and writing instruction. There is a clear need for exploratory research into the relationships of students' reading and writing performance.

One benefit of this study might be to help clarify the utility of integrating reading and writing instruction. If there is a relationship between reading and writing, then this study may help identify

the specific areas of reading and writing that are most highly correlated. Although learning to write is a valuable tool in itself, the primary focus in elementary and middle school education has been on reading. Thus, if writing is shown to be a reading enhancing activity, perhaps it will receive greater acceptance by teachers.

Another benefit of this study concerns future research. If the relationship between reading and writing is significant, it could provide another avenue for research on reading comprehension. For example, if paragraph level activities are shown to be significantly related to reading, experimental studies might be designed to test specific techniques at the paragraph level in order to determine effective methods for improving reading through writing.

Because this is a correlational study, subsequent experimental studies will be needed to determine causal direction of any significant correlations. However, this study should first be undertaken to determine if there is a significant relationship. Findings about this relationship should provide important information and direction in considering what specific aspects of reading and writing need to be included in subsequent experimental studies.

Hypothesis

The following hypothesis was tested in this study:

> There will be no significant correlation between writing constructs derived from a factor analysis of the National Assessment of Educational Progress writing scores and reading achievement total score

and subscores measured by the Metropolitan Achievement Tests.

Delimitations and Limitations

The delimitations of this study were to 99 seventh- and eighth-grade students who comprised one teaching unit in an open-space classroom in one middle school located in a rural setting. The data were from one sample of descriptive writing and one administration of the Metropolitan Achievement Test, all collected within one week's period in the spring of 1981. Generalization of these findings is limited to populations and conditions similar to those described above.

Assumptions

In this study the following were assumed:

1. The Metropolitan Achievement Test represents each student's reading ability.
2. The writing sample represents each student's writing ability.

Definition of Terms

For purposes of this study the following terms were used as defined:

Reading: Reading refers to students' performance on the reading tasks as measured by the Metropolitan Achievement Tests.

Writing: Writing refers to the students' performance on a descriptive composition written in one sitting

according to the National Assessment writing assignment "Describe Something."

In addition, definitions of the following terms used in scoring the writing sample were taken directly from the National Assessment of Educational Progress publication Results from the Third National Writing Assessment (1980):

Holistic scoring:

> The primary task of holistic scoring is to rank order all papers from best to worst (on a scale of four to one) not to identify errors or to specify writing problems. A holistic score does not focus on particular aspects of a paper such as mechanics or organization. Rather, it is an indication of an overall impression of each paper relative to the other papers read. (p. 8)

Cohesion:

> The term cohesion refers in general to the many ways words and ideas are linked together in writing to create a sense of wholeness and coherence. The scoring guide devised by the National Assessment of Educational Progress requires readers to sort papers into groups representing four degrees of cohesiveness. (p. 9)

Syntax:

> Syntax refers to the ways in which words are put together to form phrases, clauses and sentences. A syntactic analysis involves breaking each paper into its "T-units" and examining the ways in which writers embed information in T-units and join T-units together. (p. 10)

T-units:

> A T-unit is a main clause with all its attendant modifying words, phrases, and dependent clauses. (p. 10)

Mechanics:

> Mechanics refers to the ways in which writers handle basic conventions of writing such as punctuation, spelling, or word choice. A mechanics analysis involves classifying the kinds of errors writers make in sentence use, punctuation, and spelling. (p. 10)

CHAPTER II
REVIEW OF THE LITERATURE

The literature review includes three areas: current knowledge on the relationship between reading and writing, research findings on the effects of reading instruction on writing performance, and research findings on the effects of writing instruction on reading performance.

Current Knowledge on the Relationship between Reading and Writing

The interrelationships among the language arts have been an area of interest for researchers, but few investigators have examined the relationships between reading and writing. In 1943, Wykoff commented on the scarcity of research investigating the traditional notions of the relationship between reading and writing skills. In 1954, the National Council of Teachers of English published a document called Interrelationships among the Language Arts. This bulletin stressed the inherent unity of the language arts and advocated an integrated approach to language arts instruction. Unfortunately, the discussion and recommendations concerning the relationship between reading and writing were very general. In 1963, Braddock and Schoer included the relationship between reading and writing in a list headed Unexplored Territory. Applebee (1977) noted, "We have progressed just far enough beyond their query to recognize that this may be an interesting avenue of investigation" (p. 535). In 1963, Loban's longitudinal study included

an examination of the relationship of reading and writing. This study and those that follow used experimental techniques in their investigations of the relationship between reading and writing and provide the basis for current knowledge on the reading-writing relationship.

Loban (1963) in his 13-year study provided evidence of a relationship between reading and writing through experimental techniques. A sample of 388 kindergarten children were followed through twelfth grade, and comparable samples of their language were collected each year. Indices of reading and writing were included in this collection. Reading ability was indexed by a teacher's rating and the Stanford Achievement Test. Writing based on a picture was classified into five categories ranging from superior to primitive (writing samples were collected beginning at grade three). The results showed that the superior group in writing had the highest reading achievement and the highest teacher's rating. Loban noted another striking fact, that every subject ranked superior in writing was reading above his chronological age and every student ranked illiterate or primitive was reading below his chronological age. He also found that as subjects continued into the upper years of elementary school the high relationship of reading and writing was more apparent.

Zeman (1969) conducted a study to describe the relationship between reading comprehension and basic sentence types and ten basic sentence structural patterns (identified by Paul Roberts). The sample included 190 second graders and 220 third graders divided into three groups, "above average," "average," and "below average" readers on the

basis of reading comprehension scores (Science Research Associates Achievement Series Reading). The subjects wrote an ending to an unfinished story to provide a writing sample. An analysis of variance indicated that as the level of reading comprehension increased, the mean proportional frequency of the simple sentence decreased, whereas the mean proportional frequency of compound and complex sentences increased. All levels of reading used the noun-verb-noun pattern most frequently. No implications for using these findings in teaching were discussed; however, further research was recommended.

Johnson (1976) also included sentence level analyses in her investigation of the relationship between reading comprehension and 11 measures of syntactic writing maturity for 144 third-, fourth-, and fifth-grade students. Johnson reported that correlations between reading comprehension and both the number of words per T-unit and the length of main clauses correlated highly at grades three, four, and five, but noted a small and negative correlation between reading achievement and the Syntactic Density Score.

Evanechko, Ollila, and Armstrong (1974) compared the performance of 118 sixth-grade students on eight reading subtests and 13 measures of syntactic maturity. The reading measure used was the Bond-Balow-Hoyt New Developmental Reading Test Intermediate Level. In the same week, a writing sample was collected and later analyzed in terms of the formula for syntactic maturity. A correlation analysis and regression analysis were used. They found that 75.9 percent of the correlations between language measures and reading measures were significant at the 0.05 level. In the regression analysis two of the 13 language measures

were consistently first in predicting reading achievement. These two were the number of Communication Units (number of ideas expressed) and Two-Count Structures (measure of complexity of language). The R^2 statistic for Communication Units was 0.23 and the R^2 statistic for Two-Count Structures was 0.30. They concluded that there was a strong interaction between the receptive behavior of reading and the expressive behavior of writing. Implications were that building on these two key competencies should improve reading.

D'Angelo (1977) developed a regression formula which could be used to predict the reading achievement of ninth-grade students from a knowledge of mental age, and skills in informational writing and listening. A sample of 245 students was categorized as high, average, or low ability according to mental ability tests. Tests for reading, listening, and an informative writing scale were also administered. He reported that reading and writing ability correlated beyond the 0.01 level of confidence; however, in the regression analysis listening comprehension and listening memory were more effective predictors of reading ability than informative writing.

Shanahan (1980) examined the relationship of learning to read and learning to write at the second- and fifth-grade levels. Measures of phonics knowledge, vocabulary, spelling, reading comprehension, and grammatical and organizational complexity of writing were administered to 256 second graders and 253 fifth graders. Those grades were chosen to maximize differences due to development and learning. He reported that reading level differences distinguished reading-writing relationships better than grade level differences. This study suggested that

the reading-writing relationship for second graders is a word recognition-spelling relationship, while for more proficient readers (fifth graders) it is more a reading comprehension-prose production relationship.

Lazdowski (1976) working with 337 junior high, senior high, and college students investigated the feasibility of using writing samples to assess reading achievement. Mechanical readability formulas were used on the writing samples and reading levels were determined by standardized tests. The study revealed a positive relationship between reading and writing ability and a formula was developed with which the reading level of a student could be predicted within one grade level from a student's written composition.

On the college level, Campbell (1976) examined the relationship of reading and writing from a sample of 40 freshmen students. Reading scores were obtained from the Nelson Denny Reading Test. Writing samples were collected and classified into four groups ranging from "Fluent and Correct" to "Neither Fluent nor Correct." The study indicated a positive relationship between reading and writing. The results of the analysis were that the better writers are the better readers and the poorer writers are the poorer readers. From these very general findings it was concluded that instruction in reading and composition should be integrated.

Grobe and Grobe (1977) conducted a college level study with 186 freshman students. The purpose was to determine if a correlation existed between reading ability and writing ability as measured by

standardized examination. Students were classified as Level I, II, or III according to answers on an essay examination. The regression analysis revealed a positive correlation (0.5) between the reading scores (from McGraw-Hill Basic Skills System Reading Test) and the writing scores. The R^2 statistic was 0.25. The conclusion was that the reading test could be used to discriminate among different writing ability groups.

A college-level study by Thomas (1976) revealed contrary findings. One of the purposes of the study was to investigate the relationship between reading and writing. The sample consisted of 405 freshmen. Reading achievement was determined by reading subtests on the Scholastic Aptitude Test. A 500-word writing sample was used to measure the overall quality of the students' writing and the sentence maturity found in their writing. The results of the analysis indicated that only a negligible relationship exists between reading and writing (0.128) and no significant relationship exists between the level of sentence maturity in a student's writing and the student's reading ability.

In a synthesis of research by Hammill and McMutt (1980) 89 correlational studies involving the relationship of reading to other language constructs were reviewed. To estimate the correlation all the coefficients depicting a relationship between reading and a particular variable were collected, and a median coefficient was computed. The variables included were listening comprehension, meaningful speaking and meaningful writing. Meaningful writing was composed of two separate areas: spelling and mechanics. The results indicated

a strong relationship between written expression and reading (0.68 for spelling and 0.52 for mechanics), a medium relationship between listening and reading (0.39) and a low relationship between speaking and reading (0.25). However, since the data for this study were drawn from many types of instrumentation and a variety of age groups, some caution should be exercised in generalizing from these findings.

An ethnographic study by Birnbaum (1981) investigated both the reading-related and composing-related behaviors of eight selected fourth- and seventh-grade students. The study identified students who were both proficient readers and writers and studied their behaviors while engaged in the two processes. The background of each student was also examined. The findings of this lengthy study revealed many important observations concerning the reading and writing process too numerous to mention. However, those observations most pertinent to the reading-writing relationship indicated that the more proficient readers and writers viewed themselves as good readers and writers, engaged in self-sponsored reading and writing, and had wide experience with different modes and topics in both reading and writing. They approached both processes with the intention of constructing meaning in print or from print. The most important implication of this study was that unless a child is given authentic uses for written language comparable to those given for oral language the reading and writing process will remain meaningless.

The relationship between writing performance and objective tests has been of interest in educational measurement. Although the primary focus of these studies is on whether an objective writing test

is predictive of writing performance, two studies also included data on the relationship of writing performance to reading achievement scores.

The relationship between children's performance on a standardized achievement battery and compositional writing performance was examined by Crocker, Ondrasik, and Lamme (1979). The study included 138 fourth-grade students. Writing samples were collected from each student and scored for both mechanistic and holistic qualities. Four subscores from the Metropolitan Achievement Test (MAT) were also obtained. Canonical correlation and multiple regression were used to determine the degree of relationship between the variables. The results indicated a relationship between standardized test scores and writing proficiency. They reported an R^2 of 0.30. An unexpected finding was that the Reading Comprehension subtest surpassed the Language Arts subtest as a predictor of writing performance.

Hogan and Mishler (1980) studied the relationship between objective and essay measures of writing skill at the elementary and junior high levels. The sample included 229 third-grade and 218 eighth-grade students. The study involved the administration of an essay-type writing exercise which was scored for holistic qualities and either a MAT-Language Instructional Test or a MAT-Survey Test which included scores in language, reading, mathematics, science, and social studies. Results indicated that within the MAT-Language Instructional Battery study skills and listening comprehension related as highly to free-writing performance as spelling, grammar, and syntax. The language test (in the Survey Battery) did relate more highly to

free-writing performance than did objective tests in the other curricular areas. The reading test showed the second highest degree of correlation with free-writing performance. The R^2 statistic for the reading subtest and free-writing task was 0.34.

The result of the Hogan and Mishler study (1980) contrasts with the result of the Crocker study and indicates an inconsistency in the research on the relationship of writing performance and reading. There is need to further clarify this relationship.

In summary, the studies reviewed in this section include samples from elementary, secondary, and college students. Studies by Loban (1963), Evanechko et al. (1974), and D'Angelo (1977) reported significant correlations between reading and writing skills. Lazdowski (1976) and Campbell (1976) found that reading ability could be predicted from a writing sample. Zeman (1969) and Johnson (1976) found that sentence types found in written compositions differed for high- and low-ability readers. Thomas (1976) found only a negligible relationship between reading and writing and no relationship between the level of sentence maturity and the reading ability of a student. Crocker et al. (1979) found that reading comprehension was a better predictor of writing performance than language tests while Hogan and Mishler (1980) found the opposite to be true. Considering the inconsistencies in the research, no conclusive evidence concerning the reading-writing relationship can be drawn from these studies.

Effects of Reading Instruction on Writing Performance

There are few studies which have been concerned with the effects of reading instruction on writing. The following investigations

involved high-school or college students. No studies were found involving elementary school students.

Schneider (1971) in a 15-week study of remedial students on a junior-college level investigated whether reading instruction would improve writing performance. Experimental group students were given 20 of their 75 hours of instruction in reading. Control groups studied the "normal course." Three measures were used in the study: a standardized test, a writing mechanics test, and an essay test. Both the experimental and control groups had pre-post gains on the measures used in the study. Therefore, he reported that no conclusions could be drawn concerning reading ability and improvement in writing ability.

D. B. Campbell (1976) instructed two sections of freshman composition in an integrated reading and writing course for 12 weeks. Two control sections studied only writing skills. The results of the experiment showed that slight and statistically non-significant differences on the reading comprehension test favored the experimental group while slight and statistically non-significant differences on the writing measure favored the control group.

Miller (1974) taught reading skills integrated with short writing assignments to 62 remedial composition students in two experimental sections. Students in the six control sections studied descriptive and expository writing and the elements of rhetoric. Results of the 15-week study showed no significant differences between the experimental and control groups on a standardized reading test or the College Placement Test. On the writing quality measure the control

groups were superior to the experimental groups at the 0.01 level of significance.

O'Donnell (1974) used two methods of teaching reading: a psycholinguistic and a traditional method. The study involved 42 remedial college freshmen in an intensive four-week course. Neither method showed significant differences on any of the three measures: syntactic maturity, composition quality, or a standardized reading test.

In summary, studies which have attempted to improve composition skills by teaching reading have generally been unsuccessful. Studies by Schneider (1971), D. Campbell (1976), Miller (1974), and O'Donnell (1974) attempted to teach writing in combination with reading or to teach specific reading skills and measure writing growth. In each study no significant differences in writing performance were reported.

Effects of Writing Instruction on Reading Performance

Researchers who have attempted to improve reading through teaching writing have shown inconsistent results.

Reed (1967) taught reading through the study of syntax and paragraph structure to seventh-grade students. After 15 weeks of instruction the experimental students showed significant gains in comprehension compared to the control groups at the 0.01 level of confidence.

Obenchain (1971) taught writing skills through a program based on expository writing which emphasized the use of logical connectives in writing. The study included 115 experimental and 101 control tenth graders. At the end of the study all experimental groups had gained

over the control group at the 0.001 level on all the writing measures. However, only those subjects taught by the instructor gained at a significant level in reading comprehension.

Nagle (1972) conducted a study with 371 eighth graders to determine the effects of a directed writing activity (a series of written assignments) on reading. The results of the analysis revealed that reading was significantly improved for those in the experimental group.

Oehlkers (1972) taught 128 first-grade children "to encode oral language" through the use of creative writing. After the one-year experiment he found no significant differences on a reading measure between the experimental and control groups.

Albartis and Collins (1980) investigated the effects of writing instruction on college students' reading skills. The sample included 817 undergraduate students enrolled in one of four introductory writing courses or four selected education courses. Results showed that all students increased their reading ability but those in the integrated reading and writing course increased their reading speed.

Another area of writing instruction that has produced important findings about reading is sentence-combining. Sentence-combining is the process of combining two or more kernal sentences into fewer sentences conveying the same meaning. In a lengthy review article, Stotsky (1975) related the development of sentence-combining which grew out of Hunt's (1965) work on the T-unit. Stimulated by Hunt's work, a number of experimental writing programs were developed to enhance the syntactic

maturity of children's writing through sentence-combining activities (Mellon, 1967; O'Hare, 1973). Those activities were specifically intended to help improve children's writing. Unfortunately, no reading measures were included in these studies. O'Hare suggested that further research investigate the effects of sentence-combining on reading.

Following this suggestion, Combs (1977) designed a study to determine if the positive effects of sentence-combining practice transferred to reading comprehension. In this study a pre- and post-test version of a reading measure was adapted. Between the two testings, the experimental group received sentence-combining instruction to enhance their ability to handle complex syntactical structures. Analysis of the results indicated that the experimental group had significant gains in reading comprehension at the 0.001 level.

In summary, those attempting to improve reading performance through direct instruction in writing skills have had mixed results. Reed (1967), Obenchain (1971), Nagle (1972), and Combs (1977) have reported that the writing programs in their studies have resulted in significant improvement in reading. On the other hand, Oehlkers (1972) reported no significant differences and Albartis and Collins (1980) found that the integrated reading/writing course only made a difference for reading speed.

Implications

The review of the literature has revealed that the interrelationships among the language arts is an area of interest for researchers in language arts and reading. It has also revealed that

research designed to identify the relationship between reading and writing is an area which has received little attention up to this time. Until Loban's (1963) study most of the discussions and recommendations concerning the relationship between reading and writing were very general and offered few specific suggestions for the classroom teacher other than stressing the inherent unity of the two processes.

The current knowledge on the relationship between reading and writing reveals a number of inconsistencies so that conclusive evidence concerning this relationship cannot be drawn from the data. Studies presented in this review seem to follow two methods. One method uses only a holistic score on the writing sample as a means of grouping students into high, medium, and low categories which are then correlated with a standardized reading test score. This design is weak because it does not look at writing on a continuous scale. The other method is to analyze the writing sample on the sentence and/or word level. These scores are then correlated with the standardized reading test scores. None of the studies reviewed have collected both holistic and sentence level scores from the writing sample and correlated these with various subscores or standardized reading tests. Also, none of the studies reviewed have factor analyzed the writing scores to determine those which may measure a similar quality.

This review of the literature indicates that there is a need for further investigation of the reading-writing relationship in order to clarify some of the inconsistencies in the existing research. It also indicates that evaluation of writing performance must include

holistic scoring as well as sentence and word level analyses in order to provide information upon which specific recommendations may be made for the improvement of instruction in reading and writing.

CHAPTER III
PROCEDURES

The purpose of this study was to investigate the relationships between students' performance in reading and written composition. An additional purpose was to determine whether specific skills of reading were significantly related to specific skills of writing in order to provide implications for reading and writing instruction.

This chapter provides information on the research methodology, subjects, instrumentation,and procedures used in conducting this study.

Research Design

The investigation described in this chapter was a correlational study consisting of a factor analysis and multiple regression analysis. The independent variables consisted of 13 writing variables determined from the National Assessment Writing Scores. The dependent variables consisted of seven reading scores determined from the Metropolitan Reading Test.

Selection of Subjects

The subjects in the sample included a total of 99 seventh- and eighth-grade students who comprised one instructional teaching unit in an open-space classroom in a public middle school. The 99 students included 36 seventh graders, 19 white males, 2 black males, 13 white females, 2 black females; and 63 eighth graders, 30 white males,

6 black males, 21 white females, and 6 black females. The students' ages ranged from 12 to 14 years.

Description of Site

The school where the data were collected was located in a north-central Florida community (population = 2,491). It was made up of students from professional, academic, and agricultural family backgrounds. It was a public middle school with grades five through eight, a total student population of 385 and a faculty of 19. Students were bused in order to achieve the racial balance reflected in the county population.

The middle school was an open-space concept school which consisted of three large teaching areas called teaching units. Within each unit a team of four teachers taught all subject areas to those students assigned to the unit. The students in this study comprised Unit III which consisted of all of the eighth graders and the oldest seventh graders in the school. They were heterogeneously grouped without regard to grade level or ability.

Instrumentation

Metropolitan Achievement Tests

The students were given the Metropolitan Achievement Tests (MAT) (1978 edition) Survey Battery Advanced 1, Form KS, on April 1, 1981, as a part of the regular annual countywide spring testing program. All of the seventh- and eighth-grade students in Unit III were given the same test at the same time in their regular classroom area. The

reading test was given during the first sitting of the survey battery. Students were informed according to the directions for administration on how to mark answer sheets which were later machine scored. Time limits for the tests were strictly adhered to and Unit III teachers proctored and administered all tests. Students were given 35 minutes to complete the reading section of the test.

The Metropolitan Achievement Tests were machine scored by the test publisher (The Psychological Corporation) and class printouts of scores were provided. The Reading Test consisted of graded reading passages with questions based on each passage. A total of 55 questions comprised the reading section of the test battery. The reading test scores included one total reading score and six reading subscores. A description of each reading subscore as described in the Teacher's Manual for Administering and Interpreting (1978) follows:

> Vocabulary—
> Questions were based on a passage vocabulary word. The student must use context clues to determine the meaning of the word as it is used in the passage. All of the words tested have more than one meaning. (p. 50)
>
> Literal Specific—
> Questions requiring literal comprehension of specific passage details. The student must use information stated explicitly in the passage to answer questions related to details, sequence, character traits, and following directions. (p. 50)
>
> Literal Global—
> Questions requiring literal comprehension of global passage information. The student uses information based on the entire passage to answer questions related to the main idea of the passage, comparisons and contrasts, and cause and effect. (p. 50)

Inferential Specific—
Questions requiring inferential comprehension of specific passage details. The student uses information implied in the passage to infer answers to questions related to details, sequence character traits, and predicting outcomes. (p. 50)

Inferential Global--
Questions requiring inferential comprehension of global passage information. The student uses information implied in all or a large section of the passage to infer answers to questions related to the main idea of the passage, comparisons and contrasts, and cause and effect. (p. 50)

Evaluation—
Questions requiring the evaluation of passage information. The student makes judgments about the contents of a passage to answer questions related to mood (overall feeling, emotional reactions), and criticism (reality as fantasy, fact as fiction, validity, author's purpose, propaganda). (p. 51)

The descriptive statistics including the mean, standard deviation, and range for the Total Reading Score and each of the six subscores of the Metropolitan Reading Test are presented in Table 1. The reliabilities of the reading tests derived from KR-20 estimates reported by the test publisher ranged from 0.87 to 0.92.

The Metropolitan Reading Test total reading score mean for the 99 subjects is 37.767 (S.D. = 9.989) out of a possible score of 55 points. The mean total reading score for the 36 seventh graders is 35.638 (S.D. = 10.569) out of 55. This is equivalent to the fiftieth percentile rank. For the 63 eighth graders in the study the mean total reading score is 38.984 (S.D. = 9.51). This is equivalent to the forty-eighth percentile rank.

Each of the six reading subscores and one total reading score determined by adding the six subscores provided the reading data points for this study.

Table 1. Descriptive statistics of metropolitan reading subscores and total reading score

Variable	N	Mean	Standard Deviation	Minimum Value	Maximum Value
Vocabulary	99	3.939	1.398	1.000	6.000
Literal Specific	99	16.556	4.003	5.000	21.000
Literal Global	99	3.677	1.236	1.000	5.000
Inferential Specific	99	6.980	2.395	1.000	11.000
Inferential Global	99	3.707	1.842	0.000	7.000
Evaluative	99	2.909	1.348	0.000	5.000
Total Reading	99	37.768	9.990	12.000	54.000

National Assessment Writing Exercise

The participants in the study were asked to write on the topic "Describe Something." This topic was selected from the National Assessment of Educational Progress (NAEP) publication The Third Assessment of Writing 1978-79 Released Exercise Set (1981, p. 323).

The writing assignment included the following directions:

> Everybody knows of something that is worth talking about. Maybe you know about a famous building like the Empire State Building in New York City or something like the Golden Gate Bridge in San Francisco. Or you might know a lot about the Mormon Tabernacle in Salt Lake City or the new sports stadium in Atlanta or St. Louis. Or you might be familiar with something from nature, like Niagara Falls, or a gigantic wheat field, a grove of orange trees, or a part of a wide, muddy river like the Mississippi. There is probably something you can describe. Choose something you know about. It may be something from around where you live, or something you have seen while traveling, or something you have studied in school. Think about it for a while and then write a description of what it looks like so that it could be recognized by someone who has read your description.
>
> Name what you are describing and try to use your best writing. (NAEP, 1981, p. 323)

Each student was given 45 minutes to write the assignment and was provided with four lines on page 1, 25 lines on page 2, as per NAEP specifications (NAEP, 1981, p. 323). This writing sample was collected at one sitting for all 99 students one week after the schoolwide Metropolitan Achievement Tests were administered.

The writing sample was assessed to produce scores on four major qualities, holistic, cohesion, mechanics and syntax. Mechanics includes scores for the number of errors for agreement, punctuation, spelling, and capitalization. Syntax includes scores on the number of

nominal clauses, nominal phrases, relative clauses, modifying phrases, adverbial clauses, adverbial phrases, and inter-T-unit coordination. Therefore, a total of 13 scores was derived from the analysis of each writing sample. These 13 scores (listed below) provided the data points for the writing analysis.

1. Holistic
2. Paragraph Coherence
3. Agreement Errors
4. Punctuation Errors
5. Spelling Errors
6. Capitalization Errors
7. Nominal Clauses
8. Nominal Phrases
9. Relative Clauses
10. Modifying Phrases
11. Adverbial Clauses
12. Adverbial Phrases
13. Inter-T-Unit Coordination

A description of each of the 13 writing scores follows. These scoring techniques are based on the procedures outlined by the National Assessment of Educational Progress Scoring Guidelines from Results from the Third Assessment of Writing (NAEP, 1980).

Holistic score. The holistic scoring procedure involved several steps. Two scorers were selected and trained in the following manner. First there was a discussion about the guidelines and characteristics of

anchor papers provided in the NAEP scoring guide. Then, examples of each of the four scoring categories were read and discussed. These examples were provided in the NAEP released exercise set. Several practice papers were read and scored by the two scorers to refine the scoring scale description and to clear up discrepancies between the two readers. When both readers were comfortable with the guidelines, the papers were scored in one sitting. Throughout the scoring session there were periodic checks between the scorers for consistency. (The inter-rater reliability was determined to be 0.72 by the Pearson product-moment correlation procedure.) The two scores were averaged to provide one holistic score used in the analysis.

The following score point categories for the holistic scoring of "Describe Something" were taken from the NAEP publication Results from the Third National Writing Assessment (1980):

> Score of 4—
> These papers choose a single object and describe it with concrete, clear language. They contain considerable detail and substance, originality of language, and some sense of structure. There may be a few minor mechanical problems. They will often have focus. (p. 58)
>
> Score of 3—
> These papers choose a single object and describe it clearly, through with less detail, originality, or focus than the 4 papers. There may be little sense of organization, but the object should be individualized and mechanical problems should be relatively minor (unless the paper is very strong). (p. 58)
>
> Score of 2—
> These papers do describe something but are thin, general, and often very short and/or confused. (p. 58)
>
> Score of 1—
> Papers scored as 1 are very brief, non-descriptive, and confused. They contain serious errors in syntax, diction, and mechanics. (p. 58)

Score of 0—
No-response papers should be given a score of 0. (p. 58)

Paragraph coherence score. The paragraph coherence scoring procedure followed a technique similar to the holistic scoring procedure. First, the readers discussed the scoring criteria and sample papers provided in the NAEP scoring guide for each score category. Several practice papers were scored and any discrepancies discussed. As before, each paper was rated independently by two readers with periodic checks for consistency. The inter-rater reliability score determined by a Pearson product-moment correlation was 0.78. The two scores were then averaged resulting in one-paragraph coherence score for each paper which was used in the data analysis.

Descriptions of the four score-points taken from the NAEP standard cohesion-scoring scale (Mullis & Mellon, 1980) follow:

Score of 1—
Little or no evidence of cohesion. Basically, clauses and sentences are not connected beyond pairings. (p. 26)

Score of 2—
Attempts at cohesion. There is evidence of gathering details but little or no evidence that these details are meaningfully ordered. In other words, very little seems lost if the details were rearranged. (p. 26)

Score of 3—
Cohesion. Details are both gathered and ordered. Cohesion is achieved in the ways illustrated briefly in the definition above. Cohesion does not necessarily lead to coherence, to the successful binding of parts so that the sense of the whole discourse is greater than the sense of the parts. In pieces of writing that are cohesive rather than coherent, there are large sections of details which cohere but these sections stand apart as sections. (p. 26)

Score of 4—

Coherence. While this may be a sense of sections within the piece of writing, the sheer number and variety of cohesion strategies bind the details and sections into a wholeness. This sense of wholeness can be achieved by a saturation of syntactic repetition throughout the piece and/or by closure which retrospectively orders the entire piece and/or by general statements which organize the whole piece. (p. 26)

Mechanics scores. The following mechanics scores were determined by counting the number of mechanical errors which occurred in each paper. Inter-rater reliability was not used since these scoring techniques were objective and were determined by the standard rules of grammar, punctuation, and capitalization which were reviewed in the NAEP scoring guide for syntax and mechanics (Mullis & Mellon, 1980). Each paper was rated by one scorer and rechecked by a second scorer in order to obtain an accurate count of mechanical errors. One score was recorded for each of the error types for each paper. A description of each mechanical error as described in the guidelines for categorizing mechanics errors follows (NAEP, 1980):

Agreement errors—

A sentence where at least one of the following is present: subject/verb do not agree, pronoun/antecedent do not agree, noun/modifier do not agree, subject/object pronoun misused, and/or verb tense shifts. (p. 95)

Punctuation errors—

Every error of commission and error of omission was scored for commas, dashes, quotation marks, semicolons, apostrophes, and end marks. The most informal rules of usage were used with the writer receiving the benefit of any doubt. (p. 96)

Spelling errors—

In addition to a misspelling, this category includes word division errors at the end of a line, two words written as one, one word written as two, superfluous plurals, and groups of distinguishable letters that do not make a legitimate word. (p. 96)

Capitalization errors—
A word is given a capitalization error score if the first word in a sentence is not capitalized, if a proper noun or adjective within a sentence is not capitalized, and if the pronoun "I" is not capitalized. (p. 96)

Syntactic scores. Scoring an essay for syntactic ability consisted of three steps:

1. Counting the number of T-units in each essay
2. Identifying the embeddings within each T-unit as to whether each is a nominal, adjectival, or adverbial
3. Identifying instances of inter-T-unit conjoinings

The following descriptions of each syntactic feature counted in this study were taken from the NAEP scoring guides for describing syntax (Mullis & Mellon, 1980). Examples from the writing of students who were in this study are included for clarification.

T-unit. A T-unit was considered to be "one main clause with all the subordinate clauses attached to it" (Hunt, 1965, p.20).

Nominal clauses. Nominal clauses occur in two forms called factive clauses and question clauses. They function in various nominal positions: subject, object, object of a preposition, subject complement, and appositive. The underlined constructions in the following sentences are examples taken from the students' writing in this study:

"They say they like living in the big city because they have more freedom" (that nominal)

"That is wear [sic] it gets its' [sic] name" (question-nominal)

Nominal phrases. Unlike nominal clauses, nominal phrases contain verbs in nonfinite (uninflected) forms, but they function in the same nominal positions as nominal clauses. The forms of nominal phrases are the infinitive and the gerund. Some examples are

"It is always nice to be able to come to my house after school" (infinitive)

"I thank God for putting a sink-hole behind my house" (object of the preposition)

"The funest [sic] part of the trip was swimming in the rivers" (complement)

Relative clauses. Relative clauses are sometimes referred to as adjectival clauses. There were three kinds considered here: restricive relatives, nonrestrictive relatives, adverbial clauses of time, place, or manner. Some examples are

"We have few people who care about this bird" (restrictive relative)

"I am thinking of something you can sleep in" (relative word deleted)

"All schools are sorry, no good torture places that take up are [sic] time" (that relative)

"I used to live in Puerto Rico, which is an island, with other islands nearby" (nonrestrictive)

"Later we lost Joey and Jeff when they went to get Cokes" (time)

Modifying phrases. Phrases functioning as adjectival modifiers which are reduced relative clauses, that is clauses whose relative-pronoun subjects and often also whose verbs have been deleted are modifying phrases. There are six kinds of modifying phrases. Some examples are

"Unit I has three teachers working inside the unit" (active participial phrase)

"It has a beautiful garden filled with different kinds of flowers" ('-ed' passive participial phrase)

"There are no animals out to play" (active infinitive phrase)

"I enjoyed my trip to Disney World" (prepositional phrase)

"It's a big, wonderful place, full of fun and excitement" (nonrestrictive adjective in post position)

"While traveling my family and I went to Bush [sic] Gardens" (adverbial phrase of time, place, or manner)

"In all of Fred's many fights he hasn't lost one" (transposed modifying phase)

Adverbial clauses. These include adverbial clauses other than relative clauses of time, place, and manner occurring in the semantic categories of reason, condition, or concession. Some examples are

"He is getting plenty of money because with the war going on we're using lots of coal" (clause of reason, specifically cause)

"The rest left us so we got out of line to try to fine [sic] them" (clause of reason, specifically purpose)

"If you ask me the Super Dome is pretty nice man-made object" (adverbial clause of condition)

Adverbial phrases. Those phrases result from the reduction of adverbial clauses, and occur in the same semantic categories. Some examples are

"Because of it we won't have little brown bugs floating in our water" (reason, specifically cause)

"We all had to go to the Clumba [sic] house to see were [sic] we could see a shaperoom [sic] at [sic]" (reason, specifically purpose)

Inter-T-unit coordination. Whole T-units may be conjoined semantically by a coordinating conjunction ("and," "or," and "nor") as well as by connective words usually called conjunctive adverbs.

Each of the 13 variables described above was tabulated for each of the 99 writing samples. These scores provided the data points which were used in the statistical analysis of the writing.

The descriptive statistics concerning the length of the writing samples written by the subjects in this study are presented in Table 2.

The results of the analysis of the writing samples indicate the total sample of 99 essays has a mean length of 108.656 words (S.D. = 64.909) with a mean of 10.070 (S.D. = 5.304) T-units per essay. The mean number of words per T-unit is 10.893 (S.D. = 3.086).

Table 2. Descriptive statistics on length of writing

Variable	N	Mean	Standard Deviation	Minimum Value	Maximum Value
Word per T-Unit	99	10.893	3.087	4.625	18.000
T-Unit	99	10.071	5.304	1.000	34.000
Word	99	108.657	64.909	16.000	348.000

The mean, standard deviation, and range of the 13 scores derived from the analysis of the writing sample are presented in Table 3.

These results indicate that for the seventh graders the mean length of the essays is 101.33 (S.D. = 57.139) words and the mean number of T-units written is 8.94 (S.D. = 4.091). For the eighth graders in the study the mean length of the essays is 112.841 (S.D. = 69.047) and the mean number of T-units written is 10.714 (S.D. = 5.818). Thus, the eighth graders wrote a mean of 11.507 more words per essay with a mean of 1.77 more T-units.

In comparison to the 1978 National Assessment results students in this study wrote an average of 108 words per essay with a mean of 10.08 T-units per essay. The NAEP mean was 122 words per essay with an average of nine sentences per essay.

To correct for the varying lengths of the essays each of 11 of the 13 writing variables (holistic and paragraph coherence scores excluded) was converted following Mellon (1969) into a ratio of mechanical errors or syntactic constructions per 100 T-units. The holistic and paragraph coherence scores were assumed to be independent of the length of the essay and were, therefore, not converted. The descriptive statistics for the corrected writing scores are presented in Table 4.

Results of the statistical analysis of the reading variables and writing variables are presented in the following section.

Table 3. Descriptive statistics of writing scores

Variable	N	Mean	Standard Deviation	Minimum Value	Maximum Value
Holistic	99	2.394	0.793	1.000	4.000
Paragraph Coherence	99	2.207	0.940	1.000	4.000
Actual Agreement	99	0.808	1.085	0.000	5.000
Actual Punctuation	99	5.434	4.513	0.000	26.000
Actual Spelling	99	3.980	3.817	0.000	22.000
Actual Capitalization	99	2.394	3.162	0.000	18.000
Actual Nominal Clauses	99	0.525	0.973	0.000	5.000
Actual Nominal Phrases	99	0.596	1.009	0.000	5.000
Actual Relative Clauses	99	2.030	2.048	0.000	9.000
Actual Modifying Phrases	99	6.747	5.470	0.000	30.000
Actual Adverbial Clauses	99	0.808	1.192	0.000	7.000
Actual Adverbial Phrases	99	0.414	0.904	0.000	5.000
Actual Inter-T-Unit Coordination	99	1.940	2.188	0.000	12.000

Table 4. Descriptive statistics for corrected writing scores

Variable	N	Mean	Standard Deviation	Minimum Value	Maximum Value
Agreement	99	9.224	13.993	0	60.000
Punctuation	99	53.935	33.018	0	175.000
Spelling	99	45.165	42.507	0	200.000
Capitalization	99	27.298	39.006	0	240.000
Nominal Clauses	99	4.976	10.277	0	71.429
Nominal Phrases	99	7.199	13.647	0	66.667
Relative Clauses	99	21.206	20.889	0	100.000
Modifying Phrases	99	68.623	43.464	0	250.000
Adverbial Clauses	99	7.604	11.894	0	77.778
Adverbial Phrases	99	4.177	9.244	0	62.500
Inter-T-Unit Coordination	99	17.773	15.055	0	71.429

CHAPTER IV
ANALYSIS OF THE DATA

The basic problem addressed by this study was to determine whether there is a significant relationship between reading and writing performance. In order to test this hypothesis, two statistical analyses were used: factor analysis and multiple regression. This chapter presents the results of the inferential statistics used in this study.

The inferential statistics for this study were obtained in four major steps. First, a correction for T-unit length was made on 11 of the 13 writing variables. Second, the 13 NAEP writing scores were factor analyzed to reduce the set of writing scores to a smaller set of constructs. Third, factor scores were produced. These factor scores provided the input for the multiple regression analysis, the final step in determining whether there was a correlation between the reading scores and the writing constructs. Each of these steps is described below.

To correct for the varying lengths of the essays, 11 out of the 13 writing variables were converted into a ratio of mechanical errors or syntactic constructions per 100 T-units.

The next step was determining the number and nature of constructs underlying the 13 NAEP writing variables. The general purpose of using factor analysis is to explain "relationships among several, difficult-to-interpret, correlated variables in terms of a few

conceptually meaningful, relatively independent factors" (Kleinbaum & Kupper, 1978, p. 376). Factor analysis was specifically used in this study to reduce the set of 13 writing variables to a few more meaningful variables.

Therefore, the holistic score, paragraph coherence score and the 11 mechanical and syntactic scores that had been corrected for T-units were submitted to a principal components factor analysis with varimax rotation. Orthogonal rotation was chosen over oblique rotation because the orthogonal rotation produced a more meaningful and interpretable factor picture. The factor analysis generated the correlation matrix in Table 5.

Two criteria were used to determine the number of factors for rotation: (1) whether the factor's eigenvalue was greater than 1.0, and (2) whether the scree test (Cattell, 1966) supported inclusion of the factor in the rotation. Five factors had eigenvalues greater than 1.0. The eigenvalues are presented in Table 6.

The scree test also supported the rotation of five factors. To apply the scree test, all roots are plotted with the eigenvalues on the y-axis and the factor number on the x-axis. A straight line is formed, and the point where the factors increase above the straight line gives the number of factors (Gorsuch, 1974). In this study, the first factor on the straight line was also included to ensure that sufficient factors were extracted. Figure 1 indicates that a total of five factors lie above the straight line or are the first factor on the straight line. Factors 1 through 5, therefore, were taken as the

Table 5. Correlation matrix

	Holistic	Paragraph Coherence	Agreement	Punctuation	Spelling
Holistic	1.000	0.649	-0.175	-0.219	-0.394
Paragraph Coherence	0.649	1.000	-0.170	-0.132	-0.245
Agreement	-0.175	0.170	1.000	0.265	0.197
Punctuation	-0.219	0.132	0.265	1.000	0.362
Spelling	-0.394	0.245	0.197	0.362	1.000
Capitalization	-0.347	0.397	0.296	0.490	0.454
Nominal Clauses	0.100	0.243	0.012	0.258	-0.056
Nominal Phrases	-0.096	0.049	-0.122	0.084	0.194
Relative Clauses	0.004	0.141	0.095	0.098	0.203
Modifying Phrases	0.335	0.396	-0.091	0.176	0.122
Adverbial Clauses	0.233	0.082	-0.133	0.179	0.073
Adverbial Phrases	0.156	0.223	-0.016	-0.028	0.005
Inter-T-Unit Coordination	-0.107	0.085	-0.171	0.231	0.137

Table 5--Continued

	Capitalization	Nominal Clauses	Nominal Phrases	Relative Clauses	Modifying Phrases
Holistic	-0.347	0.010	-0.096	0.004	0.335
Paragraph Coherence	-0.397	0.243	0.049	0.141	0.396
Agreement	0.296	0.012	-0.122	0.095	-0.091
Punctuation	0.440	0.258	0.084	0.098	0.176
Spelling	0.454	-0.056	0.194	0.203	0.122
Capitalization	1.000	-0.041	-0.129	0.113	-0.011
Nominal Clauses	-0.041	1.000	0.045	0.012	0.127
Nominal Phrases	-0.129	0.045	1.000	-0.042	0.302
Relative Clauses	-0.113	0.012	-0.042	1.000	0.088
Modifying Phrases	-0.011	0.127	0.302	0.088	1.000
Adverbial Clauses	0.102	0.299	-0.003	0.001	0.070
Adverbial Phrases	-0.145	0.138	-0.046	0.009	0.072
Inter-T-Unit Coordination	0.048	0.013	-0.034	0.178	-0.116

Table 5--Continued

	Adverbial Clause	Adverbial Phrase	Inter-T-Unit Coordination
Holistic	0.233	0.156	-0.107
Paragraph Coherence	0.082	0.223	0.085
Agreement	-0.133	-0.016	-0.171
Punctuation	0.179	-0.028	0.231
Spelling	0.073	0.005	0.134
Capitalization	0.102	-0.145	0.048
Nominal Clauses	0.299	0.138	0.013
Nominal Phrases	-0.003	-0.046	-0.034
Relative Clauses	-0.001	0.009	-0.178
Modifying Phrases	0.069	0.072	-0.116
Adverbial Clauses	1.000	0.169	0.213
Adverbial Phrases	0.169	1.000	-0.092
Inter-T-Unit Coordination	0.213	-0.092	1.000

Table 6. Eigenvalues and corresponding percentages of common variance

Factor	Eigenvalue	Percentage Common Variance	Factor	Eigenvalue	Percentage Common Variance
1	2.748	0.211	8	0.799	0.061
2	1.955	0.150	9	0.606	0.047
3	1.446	0.111	10	0.423	0.033
4	1.295	0.100	11	0.353	0.027
5	1.032	0.079	12	0.301	0.023
6	0.963	0.074	13	0.202	0.016
7	0.067	0.067			

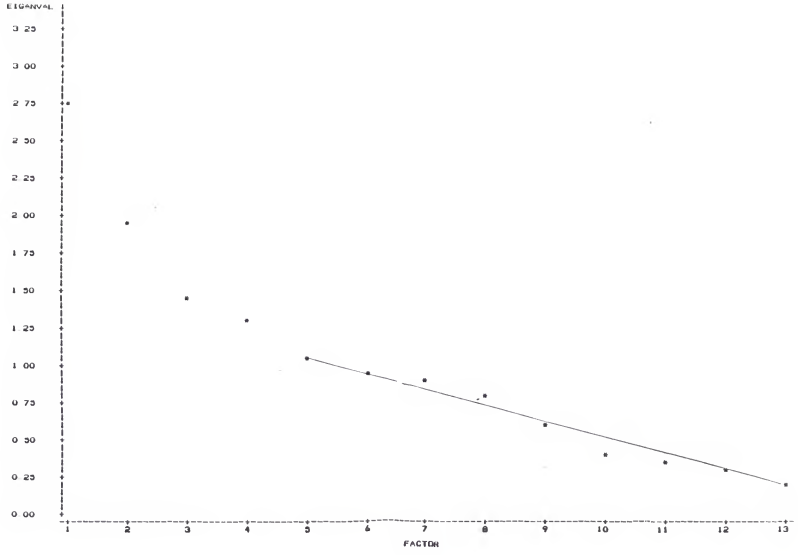

Figure 1. Scree test plot

dominant factors and were rotated, producing the factor loadings given in Table 7.

Factor 1 had four writing variables with factor loadings greater than 0.50: Agreement, Punctuation, Spelling, and Capitalization. Factor 1 was, therefore, identified as Writing Mechanics. Factor 2 had three writing variables with factor loadings in excess of 0.50: Holistic, Paragraph Coherence, and Nominal Clauses. These three variables are indicative of high overall writing quality. Factor 2 was identified as Writing Quality. Factor 3 had two writing variables with factor loadings in excess of 0.50, Adverb Clauses and Coordination, and one writing variable with a factor loading less than -0.50, Agreement. There appeared to be no theoretical basis for these loadings. Factor 3 was identified as Adverb-Clause/Coordination. Factor 4 had Nominal Phrases and Modifier Phrases with factor loadings greater than 0.50. Both of these variables are syntactic structures that are descriptive in nature. Factor 4 was called Nominal/Modifying Phrases. Finally, Factor 5 was highly related to Relative Clauses and moderately related to Spelling. There was no theoretical basis noted to explain these loadings. Factor 5 was called Relative Clauses. Only one variable, Adverbial Phrases, did not load on any factor. Table 8 gives the factor weights associated with the factor loadings obtained by the orthogonal rotation of the 13 NAEP writing variables. The factor weights were used to compute five factor scores for each of the 99 subjects in the study. Those five factor scores for each subject provided the independent variables in the regression analysis presented in Table 9. The

Table 7. Factor loadings from factor analysis with varimax rotation of 13 NAEP writing variables

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Holistic	-0.415	0.704	-0.120	0.079	-0.157
Paragraph Coherence	-0.378	0.696	-0.009	0.262	0.029
Agreement	0.547	0.004	-0.539	-0.233	0.090
Punctuation	0.804	0.148	0.152	0.174	-0.120
Spelling	0.577	-0.242	0.184	0.275	0.517
Capitalization	0.792	-0.179	0.001	-0.087	-0.049
Nominal Clauses	0.252	0.593	0.118	0.017	-0.058
Nominal Phrases	-0.016	-0.149	0.090	0.812	0.018
Relative Clauses	-0.100	0.076	-0.163	0.011	0.867
Modifying Phrases	0.080	0.422	-0.174	0.724	0.026
Adverbial Clauses	0.194	0.494	0.554	-0.103	0.112
Adverbial Phrases	-0.045	0.462	0.021	-0.155	0.274
Inter-T-Unit Coordination	0.092	-0.039	0.792	-0.030	-0.126

Table 8. Factor weights

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Holistic	-0.095	0.318	-0.112	0.005	-0.134
Paragraph Coherence	-0.104	0.291	-0.017	0.121	0.027
Agreement	0.292	0.111	-0.436	-0.165	-0.002
Punctuation	0.379	0.139	0.025	0.100	-0.160
Spelling	0.182	-0.107	0.150	0.177	0.417
Capitalization	0.349	0.002	-0.056	-0.053	-0.093
Nominal Clauses	0.174	0.325	0.031	-0.049	-0.067
Nominal Phrases	-0.044	-0.163	0.060	0.586	-0.017
Relative Clauses	-0.088	0.023	-0.032	-0.043	0.749
Modifying Phrases	0.084	0.164	-0.174	0.472	-0.047
Adverbial Clauses	0.091	0.254	0.389	-0.143	0.137
Adverbial Phrases	0.010	0.243	0.026	-0.170	0.247
Inter-T-Unit Coordination	-0.017	-0.047	0.579	-0.030	-0.035

correlation matrix of the five writing factors and the MAT subscores and total reading score is presented in Table 10.

In order to determine whether the five factors of writing were significant predictors of the total MAT reading score, the five writing factors were regressed on the total MAT reading score. The full model is as follows:

$$\text{Total Reading} = \beta_0 + \beta_1 (\text{Factor 1}) + \beta_2 (\text{Factor 2}) + \beta_3 (\text{Factor 3}) + \beta_4 (\text{Factor 4}) + \beta_5 (\text{Factor 5})$$

The overall tests for the above model resulted in an F-value of 8.17 and a P-value of 0.0001. The specific regression coefficients and tests of significance are reported in Table 9. Examination of the P-values indicates that Factors 1, 2, and 4 are significant predictors of the Total MAT Reading Score at the 0.05 level. The negative B value for Factor 1 and the positive B values for Factors 2 and 4 indicate that Factor 1 is inversely related to the Total MAT Reading Score, whereas Factors 2 and 4 are positively related to the Total MAT Reading Score. Neither Factor 3 nor Factor 5 are significant predictors of the Total MAT Reading Score at the 0.05 level. The R^2 indicates that the five factors accounted for approximately 31 percent of the variance in the total reading score.

In addition to regressing the five writing factors on the Total MAT Score, the five writing factors were also regressed on each

Table 9. Results of the multiple regression of five writing factors on Total Metropolitan Reading Score

Independent Variable	B Value	F Value	Prob. > F
Factor 1	-4.008	21.55	0.0001
Factor 2	2.584	8.96	0.0035
Factor 3	-0.724	0.70	0.4038
Factor 4	2.573	8.88	0.0037
Factor 5	-0.759	0.77	0.3819
	R^2 = 0.305275		

Table 10. Correlation matrix of writing factors and MAT Reading Scores

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Vocabulary	-0.346	0.102	-0.088	0.190	-0.013
Literal Specific	-0.382	0.269	-0.040	0.194	-0.067
Literal Global	-0.255	0.237	-0.145	0.150	-0.148
Inferential Specific	-0.363	0.160	-0.068	0.232	-0.066
Inferential Global	-0.293	0.232	-0.026	0.281	-0.015
Evaluative	-0.201	0.193	-0.037	0.201	-0.076
Total Reading	-0.401	0.259	-0.072	0.258	-0.076

of the five MAT subscores: Vocabulary, Literal Specific, Literal Global, Inferential Specific, Inferential Global, and Evaluative. (See Appendix.) Three of the subtests—Literal Specific, Inferential Global, and Evaluative—had the same significant predictors as the total reading test, namely Factors 1, 2, and 4. The subtests Vocabulary and Inferential Specific had only Factors 1 and 4 as significant predictors. Factors 1 and 2 were the only significant predictors of the subtest Literal Global.

In summary, the results of the factor analysis indicated that five factors were meaningful in measuring the writing performance of the students in this study. The results of the multiple regression analysis indicated that three of these five factors were significant predictors of the total MAT reading score. The were Factor 1 (Writing Mechanics), Factor 2 (Writing Quality), and Factor 4 (Nominal/Modifying Phrases).

The hypothesis (stated in the null) for this research was

> There will be no significant correlation between writing constructs derived from a factor analysis of the NAEP writing scores and reading achievement measured by the MAT achievement tests total reading score and subscores.

Based on the results of this study, the null hypothesis was rejected. This indicates that there is a significant relationship between specific factors in reading and writing performance.

CHAPTER V
DISCUSSION

The purpose of this study was to determine whether specific skills of reading are significantly related to specific skills of writing in order to provide implications for reading instruction.

The interrelationships among the language arts have been an area of interest for researchers in language arts and reading (Artley, 1954; Betts, 1957; Loban, 1976; Moffett, 1968). The need for further research to explore the specific interrelationships has been noted by Townsend (1954) and Applebee (1977).

Up to the present, the correlation and descriptive research has included findings on the significance of several combinations of language arts variables, such as the relationship between oral language and writing (Becker, 1963; Radcliffe, 1972), between oral language and reading (Betts, 1943; Ruddell, 1965), and between reading and listening ability (Meckel, 1963). Few researchers, however, have designed research to identify specific relationships between reading and writing.

The current knowledge on the relationship between reading and writing has revealed a number of inconsistencies. Studies by Loban (1963), Evanechko et al. (1974), and D'Angelo (1981) reported significant correlations between reading and writing skills. Lazdowski (1976) and Campbell (1976) found that reading ability could be predicted from a writing sample. Zeman (1969) and Johnson (1976) found that sentence

types found in written compositions differed for high- and low-ability readers. Thomas (1976) found only a negligible relationship between reading and writing and no relationship between the level of sentence maturity and the reading ability of a student. Crocker et al. (1979) found that reading comprehension was a better predictor of writing performance than language tests, while Hogan and Mishler (1980) found the opposite to be true.

Research designed to improve composition skills by methods used to teach reading have generally been unsuccessful. Also, researchers who have attempted to improve reading through specific methods for teaching writing have shown inconsistent results. Considering the inconsistencies, it has not been possible to draw from the data conclusive evidence concerning the relationship between reading and writing.

Studies presented in the literature review have followed three methods. In one method only a holistic score was correlated with a reading test score. In another method the writing sample was analyzed only on the sentence and/or word level. Then this method correlated the sentence or word level count with a reading test score. In most of the studies a third method was used. Both holistic and sentence level scores from the writing samples were correlated with subscores or standardized reading tests. The literature review indicated that there was a need for further investigation of the reading-writing relationship in order to help clarify the inconsistencies in the existing research and to provide information from which specific recommendations might be made for the improvement of instruction in reading and writing.

In this study, 36 seventh-grade students and 63 eighth-grade students were administered the Metropolitan Achievement Test (MAT) Form KS as a part of the countywide annual spring testing program. Each of the 99 students was also asked to write on the topic "Describe Something" selected from the National Assessment of Educational Progress (NAEP) publication The Third Assessment of Writing 1978-79 Released Exercise Set (1981, p. 323). The writing sample was collected in one sitting one week after the MAT was administered.

The data for analysis included a total reading score and six reading subscores from the MAT. The subscores included Vocabulary, Literal Specific, Literal Global, Inferential Specific, Inferential Global, and Evaluation. In addition, the writing sample collected from each student was analyzed to produce 13 NAEP writing scores, one for each of the following qualities: holistic, paragraph coherence, agreement errors, punctuation errors, spelling errors, capitalization errors, nominal clauses, nominal phrases, relative clauses, modifying phrases, adverbial clauses, adverbial phrases, and inter-T-unit coordination. These scores were determined as described in the guides provided by the National Assessment data. Training for the NAEP scoring procedures was also administered to the scorers as outlined by National Assessment guidelines.

The null hypothesis tested in the study was

> There will be no significant correlation between writing constructs derived from a factor analysis of the NAEP writing scores and reading

achievement measured by the MAT total reading score and subscores.

The data were analyzed by a factor analysis and multiple regression analysis using the Statistical Analysis System (SAS).

The 13 NAEP writing variables were factor analyzed to reduce the set of writing scores to a smaller set of constructs. Multiple regression was used to determine the extent of correlation between the MAT reading scores and the writing constructs derived from the factor analysis.

The null hypothesis was rejected in this study, indicating that there was a significant relationship between reading and specific factors in writing performance.

The purpose of using factor analysis was to determine whether several of the 13 writing variables were measuring the same aspect of writing and could be reduced to fewer conceptually meaningful factors. In this study five factors were determined to be meaningful in measuring the writing performance of this group of students (Writing Mechanics, Writing Quality, Adverbial Clause/Coordination, Nominal/Modifying Phrases, and Relative Clauses). Of these five factors, three were significantly related to reading: the Writing Mechanics factor, which included agreement, punctuation, spelling and capitalization; the Writing Quality factor, which included the holistic score and paragraph coherence; and the Nominal/Modifying Phrases factor.

Therefore, the results of this study indicate that agreement (subject/verb, pronoun/antecedent, noun/modifier, subject/object

pronoun, verb-tense), punctuation, and capitalization are statistically significant predictors of reading.

In addition, overall writing quality and coherence are significantly related to reading; that is, the holistic aspects of writing, paragraph coherence, and the presence of nominal clauses in a student's writing are predictive of reading.

Finally, the results show that the use of nominal phrases and modifying phrases in writing is also predictive of reading.

With the exception of the reading subtests Vocabulary, Literal Global, and Inferential Specific, the same three factors discussed above were found to be significant in predicting the subscores of reading and for the total reading score. In the other three exceptions, only two factors [Factor 1 (Writing Mechanics) and Factor 2 (Writing Quality)] were significant, but the third factor [Factor 4 (Nominal/Modifying Phrases)] was very near the significance level. For this reason, this discussion will consider that the results based on the total reading score reflect the same results as those based on the reading subscores.

Another explanation drawn from these results concerns the factor identified as Nominal/Modifying Phrases. It is likely that this factor was related to the rhetorical mode of writing used in this study, which was descriptive writing. Nominals and modifiers are prominent in this kind of writing, and research (West, 1980) has shown that rhetorical mode is related to the type and number of nominal features.

Research Implications

The results of this study support one of the findings in the study by Crocker et al. (1979) in that the holistic score was identified as the most important of the eight measures of writing proficiency in that study and was significantly related to performance in reading comprehension. The present study also indicated that the holistic quality was a dominant factor and significantly related to reading comprehension.

The results also support the findings in studies by Loban (1963), D'Angelo (1977), Hogan and Mishler (1980), and Shanahan (1980) that reading and writing performances are significantly related.

The findings in this study that Nominal/Modifying Phrases were significantly related to reading contrasts with the finding in the study by Evanechko et al. (1974) where Noun Modifiers were not related to reading. The present study does support other findings by Evanechko et al. which indicate that two-count structures (measure of complexity of language) were related to reading. However, the elements contained in two-count structures fell into two different factors [Factor 3 (Adverb-Clause/Coordination) and Factor 4 (Nominal/Modifying Phrases)] indicating that the two-count category included more than one aspect of writing.

The results of this study also support observations of Birnbaum (1981) who recommended that teachers should stress the meaning-making functions of written language. This would include both the global meanings as well as the more detailed meaning that mechanics add to the process of reading and writing. Birnbaum also encourages the integration

of reading and writing instruction and emphasizes the need to give students more opportunities to experience practical reading and writing activities.

Another important point revealed from these findings is the need for research studies that are designed to analyze writing for mechanistic, holistic, and syntactic qualities since all three are distinct characteristics of writing and cannot be represented by only a holistic or syntactic analysis. The results of this study have indicated that each of these three characteristics of writing fall into a different factor and that all three are significantly related to reading. Though it may be time consuming, it provides a more complete analysis of a student's writing.

It is also important to keep in mind that the R^2 in this study indicated that the five writing factors accounted for 31 percent of the variance in the total reading score. This statistic was comparable to the R^2 reported in studies by Evanechko et al. (1974), Grobe and Grobe (1977), Crocker et al. (1979), and Hogan and Mishler (1980). However, other characteristics, possibly cognitive and/or affective, might also add to the variance of the reading scores. Factors such as these need to be studied also.

Pedagogical Implications

One purpose of this study was to provide implications for classroom reading and writing instruction. In view of the outcomes of this study, the following recommendations are offered regarding reading and writing instruction:

1. Reading and writing instruction should be integrated since there is a significant relationship between reading and writing performance. More specifically, reading and writing classes should include instruction in the mechanics of the language, the overall organization and coherence of paragraphs, and what nominal/modifying phrases are and the meaning they add to a sentence. These three areas should be an integral part of reading and writing instruction and should be reflected in the teaching strategies, curriculum, and materials in the classroom. For example, reading instructional activities designed to teach the use of mechanics, cohesive devices, and overall organization methods in the reading materials might be useful. Teaching materials might be used that demonstrate how those factors help in comprehending reading. For example, exercises which leave out mechanics or direct students to reorganize paragraphs into a coherent essay might be tested. Teachers also might find that calling attention to these factors in the reading material might provide clarity and increase the understanding of a piece of writing.
2. Reading teachers should be knowledgeable in the teaching methodology and terminology of writing and writing teachers should be knowledgeable in the

teaching methodology and terminology of reading. In order for reading and writing instruction to be integrated as noted above, it is essential that teachers be prepared in both the content of reading and writing instruction as well as in the techniques and strategies for teaching them in the classroom. At the present time few university teacher education programs require methods courses in how to teach the mechanics of writing or the composing process. If such is included in training elementary teachers, it often is quickly passed over in a course that includes the teaching of all the language arts. Also, teacher training in methods of instruction rarely relates the two processes.

3. The results of this study indicate that students' reading skills might improve if they are instructed to use appropriate punctuation, capitalization, spelling and agreement in their writing in addition to paying attention to the overall quality of their writing. Teachers should be cautioned not to overlook mechanical mistakes and not to evaluate solely on the basis of a "good idea" or holistic quality of the writing. Instead, they should encourage students to write several drafts, first concentrating on the content and then editing to make effective use of mechanics. Students

need to be taught how mechanics can enhance meaning in their writings.

4. When grouping students for instruction in reading or composition, teachers should consider both reading test scores and writing performance samples, since they have been shown to be significantly related.
5. Teachers should be knowledgeable about the realtionship between reading and writing and should realize that mechanics assist the reader in getting meaning from material and that such knowledge can assist them in producing quality compositions.

Implications for Further Research

The following implications for future research were indicated by the results of this study:

1. Experimental studies should be designed to test the direction of causality. This study has shown that reading and writing performance are significantly related. Further studies should be designed (using the factors found significant in this study) to test whether the methods for teaching reading and writing suggested herein actually improve reading and writing performance.
2. Experimental studies should be developed to investigate how specific instructional techniques in mechanics, overall quality or use of nominal/modifying phrases

affect reading and writing performance. For example, materials and strategies might be developed to teach how to add coherence to a piece of writing and how this provides meaning to reading. Experimental and control groups could be set up with a pretest and posttest on reading comprehension to determine whether this program makes a significant difference on the reading scores.

3. Further investigations should be done to determine whether the results of this study on descriptive writing are the same across different rhetorical modes of writing. In particular, this would help to clarify whether Factor 4 (Nominal/Modifying Phrases) was found to be a significant predictor of reading only because of the descriptive nature of the writing assignment.
4. Further research should be designed to test whether the results of this study on seventh and eighth graders are stable across different age groups.
5. More ethnographic studies of the reading and writing process should be conducted using information gained in this study as a basis for observations and investigation. An interview and/or observation might focus on the subjects' abilities to use these factors found to be significant in this study.

APPENDIX
RESULTS OF OVERALL MULTIPLE REGRESSION ANALYSIS FOR MAT READING SCORES

APPENDIX
RESULTS OF OVERALL MULTIPLE REGRESSION ANALYSIS
FOR MAT READING SUBSCORES

Dependent Variable: Vocabulary R-Square = 0.263

Independent Variable	B Value	F Value	Prob. > F
Factor 1	-0.484	13.49	0.0004
Factor 2	0.143	1.18	0.2800
Factor 3	-0.123	0.87	0.3526
Factor 4	0.265	4.05	0.0472
Factor 5	0.018	0.02	0.8924

Dependent Variable: Literal Specific R-Square = 0.262

Independent Variable	B Value	F Value	Prob. > F
Factor 1	-1.529	18.41	0.0001
Factor 2	1.078	9.14	0.0032
Factor 3	-0.162	0.21	0.6516
Factor 4	0.778	4.77	0.0316
Factor 5	-0.267	0.56	0.4551

Dependent Variable: Literal Global R-Square = 0.1866

Independent Variable	B Value	F Value	Prob. > F
Factor 1	-0.316	7.46	0.0075
Factor 2	0.292	6.40	0.0131
Factor 3	-0.179	2.40	0.1250
Factor 4	0.185	2.56	0.1129
Factor 5	-0.183	2.51	0.1164

Dependent Variable: Inferential Specific R-Square = 0.2197

Independent Variable	B Value	F Value	Prob. > F
Factor 1	0.869	15.68	0.001
Factor 2	0.382	3.04	0.0845
Factor 3	-0.163	0.55	0.4595
Factor 4	0.554	6.40	0.0131
Factor 5	-0.159	0.52	0.4707

Dependent Variable: Inferential Global R-Square = 0.220

Independent Variable	B Value	F	Prob. >F
Factor 1	-0.539	10.24	0.0019
Factor 2	0.428	6.44	0.0128
Factor 3	-0.048	0.08	0.7758
Factor 4	0.518	9.45	0.0028
Factor 5	-0.028	0.03	0.8677

Dependent Variable: Evaluation R-Square = 0.1253

Independent Variable	B Value	F	Prob. > F
Factor 1	-0.270	4.28	0.0414
Factor 2	0.261	3.98	0.0490
Factor 3	0.049	0.14	0.7057
Factor 4	0.271	4.31	0.0408
Factor 5	-0.103	0.62	0.4325

BIBLIOGRAPHY

Albartis, C., & Collins, C. The effect of writing instruction and reading methodology upon college students' reading skills. Journal of Reading, 1980, 23, 408-413.

Applebee, A. M. Writing and reading. Journal of Reading, 1977, 20, 534-537.

Artley, A. S. Introduction. In A. S. Artley, G. H. Hildreth, A. Townsend, A. Beery, & M. A. Dawson (Eds.), Interrelationships among the Language Arts, Research Bulletin of the National Conference on Research in English. Champaign, Illinois: National Conference of Teachers of English, 1954.

Becker, S. L. Relationships among the communication skills. Central States Speech Journal, 1963, 14, 258-263.

Betts, A. Factors in readiness for reading. Educational Administration and Supervision, 1943, 29, 219-224.

_____. Foundations of Reading Instruction. New York: American Book Co., 1957.

Birnbaum, J. C. A study of reading and writing behaviors of selected fourth- and seventh-grade students (Doctoral dissertation, Rutgers University, The State University of New Jersey, 1981). Dissertation Abstracts International, 1981, 42, 152A-153A.

Bond, G. L., & Wagner, E. B. Teaching the child to read. New York: Macmillan, 1966.

Braddock, R. L., & Schoer, L. Research in written composition. Champaign, Illinois: National Council of Teachers of English, 1963.

Campbell, D. B. A study of two methods of teaching English in a community college setting (Doctoral dissertation, Virginia Polytechnical Institute and State University, 1976). Dissertation Abstracts International, 1976, 37, 4808A.

Campbell, M. M. An investigation of the relationship between secondary generative and recuperative communication skills at the college freshman level (Doctoral dissertation, University of Southern Mississippi, 1976). Dissertation Abstracts International, 1976. 37, 5655A.

Cattell, R. B. The scree test for the number of factors. Multivariate Behavioral Research, 1966, 1(2), 245.

Combs, W. E. Sentence-combining practice aids reading comprehension. Journal of Reading, 1977, 21, 18-24.

Crocker, L., Ondrasik, T., & Lamme, L. Predicting children's writing performance from standardized achievement tests. Paper presented to National Council on Measurement in Education, San Francisco, 1979.

D'Angelo, J. L. Predicting reading achievement in a senior high school from intelligence, listening, and informative writing (Doctoral dissertation, University of Pittsburgh, 1977). Dissertation Abstracts International, 1981, 38, 2027A.

Durkin, D. Children who read early. New York: Teachers College Press, Columbia University, 1966.

Evanechko, P., Ollila, L., & Armstrong, R. An investigation of the relationships between children's performance in written language and their reading ability. Research in the Teaching of English, 1974, 8, 315-325.

Gorsuch, R. L. Factor analysis. Philadelphia: W. B. Saunders, 1974.

Grobe, S. F., & Grobe, C. H. Reading skills as a correlate of writing ability in college freshmen. Reading World, 1977, 17, 50-54.

Hammill, D. D., & McMutt, G. Language abilities and reading: A review of the literature on their relationship. The Elementary School Journal, 1980, 80(5), 269-377.

Hildreth, G. H. Interrelationships between written expression and the other language arts. In A. S. Artley, G. H. Hildreth, A. Townsend, A. Beery, & M. A. Dawson (Eds.), Interrelationships among the Language Arts, Research Bulletin of the National Conference on Research in English. Champaign, Illinois: National Conference of Teachers of English, 1954.

Hogan, T. P., & Mishler, C. Relationships between essay tests and objective tests of language skills for elementary school students. Journal of Educational Measurement, 1980, 17, 219-227.

Hunt, K. Grammatical structures written at three grade levels. Research Report No. 3. Champaign, Illinois: National Council of Teachers of English, 1965.

Johnson, N. A comparison of syntactic writing maturity with reading comprehension. Paper presented to International Reading Association, Texas State Council Conference, 1976. (ERIC Document Reproduction Service No. ED 141 784)

Kleinbaum, D. G., & Kupper, L. L. Applied regression analysis and other multivariate methods. North Scituate, Massachusetts: Duxbury Press, 1978.

Lazdowski, W. P. Determining reading grade levels from analysis of written compositions (Doctoral dissertation, New Mexico State University, 1976). Dissertation Abstracts International, 1976, 37, 1504A.

Loban, W. A. The language of elementary school children. Research Report No. 1. Urbana, Illinois: National Council of Teachers of English, 1963.

_____. Language development: Kindergarten through grade twelve. Research Report No. 18. Urbana, Illinois: National Council of Teachers of English, 1976.

Meckel, H. C. Research on teaching composition and literature. In M. L. Gage (Ed.), Handbook of research on teaching. Chicago: Rand-McNally, 1963.

Mellon, J. C. Transformational sentence-combining: A method for enhancing the development of syntactic fluency in English composition. Research Report No. 10. Urbana, Illinois: National Council of Teachers of English, 1969.

Miller, T. J. A quantitative study of the "free modifiers" in narrative-descriptive compositions written by black college freshmen after leaving the influence of the Christensen Program and a study of their attitudes toward written composition (Doctoral dissertation, Ohio State University, 1974). Dissertation Abstracts International, 1974, 33, 3483A.

Moffett, J. A. A student-centered language arts curriculum, grades K-6. Boston: Houghton-Mifflin, 1968.

Mullis, I. V., & Mellon, J. C. Guidelines for describing three aspects of writing: Syntax, cohesion, and mechanics. Denver, Colorado: National Assessment of Educational Programs, 1980.

Nagle, J. E. The effects of a directed writing activity in eighth-grade social studies instruction on general reading achievement and on social studies reading achievement (Doctoral dissertation, Temple University, 1972). Dissertation Abstracts International, 1972, 33, 1523A.

National Assessment of Educational Progress. Writing achievement, 1969-79: Results from the third national writing assessment. Denver, Colorado: National Assessment of Educational Progress, 1980.

National Assessment of Educational Progress. The third assessment of writing, 1978-79 released exercise set. Denver, Colorado: National Assessment of Educational Progress, 1981.

Obenchain, A. Effectiveness of the precise essay question in programming the sequential development of written composition skills and the simultaneous development of critical reading skills (unpublished Master's thesis, George Washington University, 1971). In Sandra L. Stotsky, Sentence-combining as a curricular activity: Its effect on written language development and reading comprehension. Research in the Teaching of English, 1975, 9, 30-71.

Oehlkers, W. The contribution of creative writing to reading achievement in the language experience approach (unpublished doctoral dissertation, University of Delaware, 1972).

O'Donnell, J. H. An experimental study of the effects of the supplemental use of psycholinguistic remedial tutorial program on the reading and writing behaviors of black, high-risk college freshmen, and on their attitudes toward reading and writing and other college-related stimuli (Doctoral dissertation, Temple University, 1974). Dissertation Abstracts International, 1974, 35, 1552A.

O'Hare, E. Sentence-combining: Improving student writing without formal grammar instruction. Research Report No. 15. Urbana, Illinois: National Council of Teachers of English, 1973.

Radcliffe, T. R. Talk-write composition: A theoretical model proposing the use of speech to improve writing. Research in the Teaching of English, 1972, 6, 187-199.

Reed, E. Improving comprehension through study of syntax and paragraph structure in seventh-grade classes. In J. A. Figurel (Ed.), Forging ahead in reading. Newark, Delaware: International Reading Association, 1967, 575-579.

Ruddell, R. B. The effect of the similarity of oral and written patterns of language structure on reading comprehension. Elementary English, 1965, 42, 403-410.

Schneider, V. L. A study of the effectiveness of emphasizing the teaching of reading skills to improve composition skills in remedial English classes at Kansas City Community Junior College (Doctoral dissertation, University of Kansas, 1971).

Shanahan, T. E. A canonical correlational analysis of the reading-writing relationship: An exploratory investigation (Doctoral dissertation, University of Delaware, 1980). Dissertation Abstracts International, 1980, 41, 1007A.

Stotsky, S. L. Sentence-combining as a curricular activity: Its effect on written language development and reading comprehension. Research in the Teaching of English, 1975, 9, 30-71.

Thomas, F. L. The extent of the relationship between reading achievement and writing achievement among college freshmen (Doctoral dissertation, University of South Carolina, 1976). Dissertation Abstracts International, 1976, 37, 6320A.

Townsend, A. Interrelationships between reading and other language arts areas. In A. S. Artley, G. H. Hildreth, A. Townsend, A. Beery, & M. A. Dawson (Eds.), Interrelationships among the Language Arts, Research Bulletin of the National Conference on Research in English. Champaign, Illinois: National Conference of Teachers of English, 1954.

Weaver, P. A. Improving reading comprehension--Effects of sentence organization instruction. Reading Research Quarterly, 1979, 15, 129-146.

West, G. K. That-nominal constructions in traditional rhetorical divisions of scientific research papers. TESOL Quarterly, 1980, 14(4), 483-488.

Wykoff, G. S. Reading as a problem in composition. College English. 1943, 4, 245-254.

Zeman, S. S. Reading comprehension and the writing of second and third graders. Reading Teacher, 1969, 23, 144-150.

BIOGRAPHICAL SKETCH

Susan Leslie Samuels Hill was born in Akron, Ohio, on March 30, 1948. She graduated from Athens High School in 1966 and studied English education at the University of Florida from 1966-1969. She completed her BA in English at the University of West Florida in 1970. Between 1970 and 1978 she taught in public schools in Florida and California. She entered Graduate School in 1978 and received an MA in language arts/ESL at Ohio State University. Upon completion of that degree she began work on a doctorate in curriculum and instruction with a major in reading. She will receive her PhD in May 1982.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Ruthellen Crews

Ruthellen Crews, Chairperson
Professor of Instructional Leadership
and Support

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

William D. Hedges

William D. Hedges
Professor of Instructional Leadership
and Support

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Stephen F. Olejnik

Stephen F. Olejnik
Assistant Professor of Foundations of
Education

This dissertation was submitted to the Graduate Faculty of the Division of Curriculum and Instruction in the College of Education and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

May 1982

Dean for Graduate Studies and Research